Government Mandated Private Pensions: A Dependable and Equitable Foundation for Retirement Security?

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Abstract

We develop a model of an overlapping generations economy characterized by private pensions where risk averse agents face both longevity and investment risks. The government mitigates the effects of longevity risk by mandating that individuals purchase annuities. Investment risk arises since the returns on annuities deviate randomly from actuarial fairness as a result of differences in the costs of administering pension funds (or, equivalently, deviate randomly from the market return as a result of differences in fund manager portfolio choice). Thus, identical agents' pensions may yield drastically different returns: the government's pension policy is not horizontally equitable. We define policies that achieve horizontal equity, and discuss heuristically the costs and benefits of implementing these policies.

I. Introduction

Spurred by demographic changes many countries are considering replacing their pay-as-you-go public pension programs with privatized programs. Privatization is something of a misnomer as pension investment, at least up to some percentage of wages, would be government mandated. Generally, privatization is imagined to take the form it has in Chile and the United Kingdom where individuals can invest in any of a number of government approved pension funds.[1] The returns on these funds can differ because of differences in portfolio choice as well as differences in costs. The individual investor bears the risk.

While many have worried about portfolio risk in regard to private pension funds, a more salient risk may be "cost risk".[2] Most countries that have established private systems have minimum income guarantees partly to address systemic or generational risk as well as to protect low wage earners. To limit idiosyncratic risk countries such as Chile and Argentina penalize pension funds whose returns deviate too much from the average return. As a result, most funds hold nearly identical portfolios.[3] Even where the portfolio compositions are similar across funds returns to investors can differ as a result of differences in costs.

The costs charged by the firm are to compensate it for collection, money management, record keeping and payouts (Mitchell 1999). In both Chile and the United Kingdom aggressive advertising by pension funds has added to the costs borne by the investor. In some countries, such as Chile, the cost structure is relatively simple with

[1] In Chile all workers below a certain age were required to participate in the private system, in the UK, in contrast, workers have the option of remaining in the public system or choosing the private system.

[2] While our analysis examines cost risk all our results also apply to portfolio risk or any other risk that is intragenerational in nature.

only front-load fees allowed. In other countries, such as Mexico and Argentina, the complexity of the fee structure makes it difficult to compare costs across pension firms. Moreover costs change over time making it difficult for an investor to determine ex ante the cost of investing in one pension fund relative to another. In Chile, because fees are levied only at the time the investment is made any changes in the cost of managing these investments must be levied on new investments. Likewise, since all privatized systems are relatively young, the cost of making payments to retirees is hard to predict.

Nor are these costs inconsequential. In many Latin American countries costs are averaging 2-3 percent of wages, substantially reducing investment returns no matter how well or poorly the portfolio is chosen.[4] In the United Kingdom, based on current costs, an individual who works for 40 years and contributes to a pension fund may have at retirement a pension balance that is 28 percent lower than it would have been in the absence of investment costs (Orszag 1999).

In this paper we develop a model that allows us to examine an overlapping generations economy characterized by private pensions. In our model risk averse agents face two types of risk: longevity risk and investment risk. The government mitigates the effects of longevity risk by mandating that each individual place a fraction of his after tax income when young in an annuity, thereby exposing all individuals to investment risk. The investment risk arises since the returns on all available annuities deviate randomly from actuarial fairness as a result of differences in the costs of administering the pension funds.[5] Thus, identical agents' pensions may yield different returns: the government's pension policy is not horizontally equitable. We examine whether policies exist that can

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[3] For details see Shah (1997) and U.S. Congressional Budget Office (1999).
[4] See for example, Mitchell (1999), Queisser (1999) and U.S. Congressional Budget Office (1999).

achieve horizontal equity, and then discuss, heuristically, the costs and benefits of implementing these policies. Specifically, we find that if the dominant form of individually undiversifiable risk faced by pensioners is administrative cost risk, then the government can improve upon the market outcome, in both expected utility and horizontal equity terms: government mandated private pensions may be a dependable and equitable foundation for retirement security.

II. The Model

Consider a Diamond (1965) style overlapping generations, infinite-horizon economy comprised of identical two-period lived agents, perfectly competitive firms, annuity markets, and a government. A new generation is born at each date t. For simplicity we assume that there is no population growth, and that at each date N agents are born. Without loss of generality assume N is unity.

Agents in this model, as in Eckstein, et al. (1985), are not altruistic: the old do not care for the young and the young do not care for the old. Agents' preferences are defined over consumption alone. Agents in the first period of their lives, the young, are endowed with one unit of labor. They supply their labor inelastically to firms. They divide their wages between their own current consumption, saving (comprised of an annuity, direct holdings of capital, or both) for consumption when old, and payment of wage taxes, $\tau_w \geq 0$, quoted as a proportion of their wages. Agents in the final period of their lives, the old, consume any old-age benefits they receive and their accumulated after tax savings. An agent dies at the onset of old age with probability $(1-p(t))$ and lives throughout old age

[5] Investment risk could arise instead as a result of differences in portfolio composition.

with probability $p(t)$. If an agent dies at the onset of old age his unannuitized wealth is bequeathed to the young.[6]

Agents may save for retirement by purchasing an annuity or by placing funds directly in capital. By law, each agent must purchase an annuity of value of at least φ percent of lifetime after tax wages. There is a fixed cost of χ per annuity contract or capital fund purchased. Agents, in their investment decision, face two forms of risk: life span and investment. Investment risk is modeled as follows. There are many possible, observationally equivalent, pensions in which an agent can invest. The funds hold identical portfolios, but there are unobservable differences in the costs of managing these funds/administering these accounts. A proportion $\pi(t)$ pay the net return $(1+r(t+1))/p(t)^{1-\lambda_1}$, while the remainder pay $(1+r(t+1))/p(t)^{1-\lambda_2}$, where $\lambda_1 \in [0,1]$ and $\lambda_2 \in [0,1]$, $\lambda_1 < \lambda_2$, measure the deviation of the return on the annuity from actuarial fairness. Since at $\lambda_i = 1$, the return on an annuity equals the return on directly held capital, no agent will choose to hold capital directly, and there will be no unintentional bequests.[7] The fixed cost is assumed to be large enough to preclude individuals from diversifying

[6] This assumption of unintentional rather than altruistic bequests is consistent with empirical findings by numerous researchers: see Hurd (1990), and Auerbach *et al*. (1992). Altonji *et al.* (1992) find that parents and their adult children are not altruistically linked. But, other researchers find an operative bequest motive (Hamermesh and Menchik, 1987; Hurd, 1995), at least among the wealthy. Laitner and Juster (1996) find support for intergenerational altruism but note that it is not the major explanation for saving. Since there is no consensus on this issue, we will maintain the assumption of unintentional bequests.

[7] We have modeled the risk faced by pensioners as arising from unobservable cost differences among the available pension funds. This leads pensions to deviate from actuarial fairness. We could, alternatively, have modeled risk as arising from portfolio choice decisions made by fund managers. For this alternative formulation, suppose that there is no aggregate risk but portfolio managers who choose not to hold the market earn returns that deviate from the market return. This would generate high return and low return funds which would pay out actuarially fair returns on the underlying portfolios. That is, assume that funds are observationally equivalent ex ante, and with probability π an agent invests in a high return fund that pays the actuarially fair return $(1+r_1)/p$ and with probability $(1-\pi)$ an agent invests in a low return fund that pays the actuarially fair return $(1+r_2)/p$. The return on the market is $\pi(1+r_1) + (1-\pi)(1+r_2)$. Analysis of this alternative model generates qualitative results identical to those in the administrative cost model.

away the investment risk on their own accounts.[8] Thus, the structure of our model gives us two groups of old agents: the rich old and the poor old.

While we have ruled out adverse selection and moral hazard as reasons for deviations from actuarial fairness, we note that all pension firms that serve real world markets face the same adverse selection and moral hazard problems, can all diversify their risks, and yet have different *ex post* returns on their annuity contracts. Moreover, Finkelstein and Poterba (1999) show that adverse selection cannot explain all of the deviation from actuarial fairness. In addition, their work indicates that much of this adverse selection cost can be eliminated through compulsory rather than voluntary annuitization.

Let the representative member of generation *t*'s preferences be represented by

$$(1) \qquad U_t(t) = \ln c_t(t) + p(t)[\pi(t)\ln c_t^H(t+1) + (1-\pi(t))\ln c_t^L(t+1)]$$

where $c_t(t)$ is consumption by a member of generation *t* when young, $c_t^H(t+1)$ [$c_t^L(t+1)$] is consumption by a member of generation *t* when old if he purchased a high-return (low charge) [low-return (high charge)] annuity, and $p(t)$ is the probability that an agent born at date *t* will live throughout old age.

The firms are perfectly competitive profit maximizers that produce output using the Cobb-Douglas production function $Y(t) = A(t)K(t)^{\alpha}N(t)^{1-\alpha}$, $\alpha \in [0,1]$. $K(t)$ is the capital stock at t, $N(t)$ is labor at date t, and $A(t) > 0$ is a productivity scalar. Capital depreciates fully in the production process.

[8] Three empirical observations support these assumptions: gross returns on government mandated private pension portfolios do not vary greatly, if at all, across pension funds; agents do not all invest in the same pension fund (that is, thus, revealed to be the low cost fund); and, agents generally do not invest in multiple funds (partly as a result of governmental restrictions).

The government in this economy may impose taxes on wages, $\tau_w(t)$, and/or taxes on the investment income of the old, $\tau_k(t+1)$, and/or impose lump sum taxes on the old, $\ell(t+1)$, to achieve its social welfare goals (specifically, horizontal equity). The government must maintain a balanced budget. The government alternatively can institute a policy under which only a single pension plan exists, where that plan pays the average of the returns on the underlying portfolios.

III. Equilibrium

A competitive equilibrium for this economy is a sequence of prices $\{w(t), R(t), r(t)\}_{t=1}^{\infty}$, a sequence of capital stocks, $\{k(t)\}_{t=1}^{\infty}, k(1) > 0$, given, a sequence of allocations, $\left\{c_t(t), c_t^H(t+1), c_t^L(t+1)\right\}_{t=1}^{\infty}$, and a sequence of taxes $\left\{\tau_w(t), \tau_k(t+1), \ell(t+1)\right\}_{t=1}^{\infty}$, such that given these prices, allocations, and taxes agents maximize utility, firms maximize profits, the government satisfies its budget constraint, and markets clear.

The representative agent at time t takes as given the wage, $w(t)$, the return on saving when old, $r(t+1)$, the tax rate on wages, $\tau_w(t)$, the tax rate on investment income, $\tau_k(t+1)$, the lump sum tax $\ell(t+1)$, old age benefits, $T^H(t+1)$ and $T^L(t+1)$, and the fixed cost of investment $\chi(t)$, and chooses pension saving, $s(t)$, to maximize (1) subject to

(2) $$c_t(t) = w(t)(1-\tau_w(t)) - s(t) - \chi(t)$$

(3a) $$c_t^H(t+1) = \left[\frac{(1+r(t+1))}{p(t)^{1-\lambda_1}} s(t)\right](1-\tau_k(t+1)) - \ell(t+1) + T^H(t+1)$$

(3b) $$c_t^L(t+1) = \left[\frac{(1+r(t+1))}{p(t)^{1-\lambda_2}} s(t)\right] + T^L(t+1)$$

(4) $$s(t) \geq \varphi w(t)(1-\tau_w(t))$$

Only the investment income of the well-off old meets the means test and so is taxed. Substituting constraints (2) and (3a,b) into the representative consumer's objective function (1), forming the Lagrangian and maximizing yields the first-order condition

(5) $$\frac{-1}{\left[w(t)(1-\tau_w(t)) - s(t) - \chi(t)\right]} +$$

$$\frac{p(t)\pi(t)(1+r(t+1))(1-\tau_k(t+1))}{p(t)^{1-\lambda_1}\left[\left[\frac{(1+r(t+1))}{p(t)^{1-\lambda_1}}s(t)\right](1-\tau_k(t+1)) - \ell(t+1) + T^H(t+1)\right]} +$$

$$\frac{p(t)(1-\pi(t))(1+r(t+1))}{p(t)^{1-\lambda_2}\left[\left[\frac{(1+r(t+1))}{p(t)^{1-\lambda_2}}s(t)\right] + T^L(t+1)\right]} + \mu = 0$$

where μ is the Lagrange multiplier on the savings constraint.

The individual firm takes wages and rental rates as given and hires labor and capital until their marginal products equal their factor prices

(6) $$(1-\alpha)A(t)k(t)^{\alpha} = w(t)$$

(7) $$\alpha A(t)k(t)^{\alpha-1} = R(t)$$

where *k(t)* is the capital-labor hours ratio. Because of the assumptions of constant returns production technology and inelastic labor supply, (6) and (7) also define factor market clearing.

The government must maintain a balanced budget, thus, taxes are set so that revenues equal benefits. We will examine four policies designed to achieve horizontal equity or to lessen the extent of horizontal inequity as well as the policy of letting the market decide, and a pay-as-you-go policy regime. The first policy achieves horizontal

equity by imposing a lump sum tax on those pensioners who invested in low charge funds and transferring the proceeds to those pensioners who invested in high charge funds

$$(8) \qquad \frac{(1+r(t+1))}{p(t)^{1-\lambda_1}} s(t) - \ell(t+1) = \frac{(1+r(t+1))}{p(t)^{1-\lambda_2}} s(t) + T^L(t+1)$$

where $\pi(t)\ell(t+1) = (1-\pi(t))T^L(t+1)$ and $T^H(t+1) = 0$.

The second policy achieves horizontal equity by taxing the pension returns of those pensioners who invested in low charge funds and transferring the proceeds to those pensioners who invested in high charge funds:

$$(9) \qquad \frac{(1+r(t+1))}{p(t)^{1-\lambda_1}} s(t)(1-\tau_k(t+1)) = \frac{(1+r(t+1))}{p(t)^{1-\lambda_2}} s(t) + T^L(t+1)$$

where $(1-\pi(t))T^L(t+1) = \pi(t)\frac{(1+r(t+1))}{p(t)^{1-\lambda_1}} s(t)\tau_k(t+1)$ and $T^H(t+1) = 0$.

The third policy reduces, but does not eliminate, horizontal inequity by taxing the wages of the young and transferring the proceeds to those pensioners who invested in high charge funds. If the policy is to decrease the inequity by ξ percent, then, for $T^H(t+1)=0$:

$$(10) \qquad \tau_w(t+1)w(t+1) = p(t)(1-\pi(t))\xi(1+r(t+1))s(t)\left[\frac{1}{p(t)^{1-\lambda_1}} - \frac{1}{p(t)^{1-\lambda_2}}\right] = p(t)T^L(t+1)(1-\pi(t)).$$

The fourth policy achieves horizontal equity as the government offers only a single pension fund that yields the average return of the underlying funds. In this case, all the tax and transfer parameters equal zero and the return on this single pension fund equals

$$(11) \qquad (1+r(t+1))\left[\frac{\pi(t)}{p(t)^{1-\lambda_1}} + \frac{(1-\pi(t))}{p(t)^{1-\lambda_2}}\right].$$

Under the fifth policy the government makes no attempt to affect horizontal equity. It neither levies taxes nor makes transfers.

Under the sixth policy, $T^H(t+1) = T^L(t+1) = T(t+1)$ and the pay-as-you-go public pension pays a replacement rate, ζ, on wages. Thus

(12) $\tau_w(t+1)w(t+1) = p(t)T(t+1) = p(t)\zeta(t)w(t+1)$.

The goods market clears when the demand for goods equals the supply of goods. Thus, saving today determines the capital stock tomorrow

(13) $s(t) = k(t+1)$

and the return on saving equals the return on capital

(14) $R(t+1) = (1 + r(t+1))$.

IV. Policy Analysis

Solving for the steady-state interior equilibrium (the mandated pension is less than the desired pension) under each of the policies yields the following allocations.

Policy 1: Lump Sum Taxes

$$k = \frac{p}{1+p}[A(1-\alpha)k^{\alpha} - \chi]$$

$$c^{Y} = \frac{1}{1+p}[(1-\alpha)Ak^{\alpha} - \chi]$$

$$c^{H} = c^{L} = \left[\frac{\pi}{p^{1-\lambda_1}} + \frac{1-\pi}{p^{1-\lambda_2}}\right]\alpha Ak^{\alpha}$$

Policy 2: Taxes on Pension Returns

$$k = \frac{p\left[\pi + \frac{(1-\pi)}{1-\pi + \frac{\pi p^{1-\lambda_2}}{p^{1-\lambda_1}}}\right]}{1 + p\left[\pi + \frac{(1-\pi)}{1-\pi + \frac{\pi p^{1-\lambda_2}}{p^{1-\lambda_1}}}\right]}[A(1-\alpha)k^{\alpha} - \chi]$$

$$c^{Y} = \frac{1}{1 + p\left[\pi + \frac{(1-\pi)}{1-\pi + \frac{\pi p^{1-\lambda_2}}{p^{1-\lambda_1}}}\right]}[A(1-\alpha)k^{\alpha} - \chi]$$

$$c^{H} = c^{L} = \left[\frac{\pi}{p^{1-\lambda_1}} + \frac{1-\pi}{p^{1-\lambda_2}}\right]\alpha A k^{\alpha}$$

Policy 3: Tax on Wages to Effect a ξ percent Reduction in Horizontal Inequity

$$k = \frac{p\left[\pi + \frac{(1-\pi)}{1+\xi\left[\frac{p^{1-\lambda_2}}{p^{1-\lambda_1}} - 1\right]}\right]}{1 + p\left[\pi + \frac{(1-\pi)}{1+\xi\left[\frac{p^{1-\lambda_2}}{p^{1-\lambda_1}} - 1\right]}\right]}\left[A(1-\alpha)k^{\alpha}\left[1 - \frac{\alpha p(1-\pi)\xi}{(1-\alpha)}\left(\frac{1}{p^{1-\lambda_1}} - \frac{1}{p^{1-\lambda_2}}\right)\right] - \chi\right]$$

$$c^Y = \frac{1}{1+p\left[\pi + \frac{(1-\pi)}{1+\xi\left[\frac{p^{1-\lambda_2}}{p^{1-\lambda_1}}-1\right]}\right]}\left[A(1-\alpha)k^\alpha\left[1-\frac{\alpha p(1-\pi)\xi}{(1-\alpha)}\left(\frac{1}{p^{1-\lambda_1}}-\frac{1}{p^{1-\lambda_2}}\right)\right]-\chi\right]$$

$$c^H = \frac{\alpha A k^\alpha}{p^{1-\lambda_1}}$$

$$c^L = \alpha A k^\alpha\left[\frac{\xi}{p^{1-\lambda_1}}+\frac{(1-\xi)}{p^{1-\lambda_2}}\right]$$

Policy 4: Single Fund

$$k = \frac{p}{1+p}[(1-\alpha)Ak^\alpha - \chi]$$

$$c^Y = \frac{1}{1+p}[(1-\alpha)Ak^\alpha - \chi]$$

$$c^H = c^L = \left[\frac{\pi}{p^{1-\lambda_1}}+\frac{1-\pi}{p^{1-\lambda_2}}\right]\alpha A k^\alpha$$

Policy 5: No Taxes-No Transfers

$$k = \frac{p}{1+p}[(1-\alpha)Ak^\alpha - \chi]$$

$$c^Y = \frac{1}{1+p}[(1-\alpha)Ak^\alpha - \chi]$$

$$c^H = \alpha A k^\alpha\left[\frac{1}{p^{1-\lambda_1}}\right]$$

$$c^L = \alpha A k^\alpha\left[\frac{1}{p^{1-\lambda_2}}\right]$$

Policy 6: Pay-as-you-go with Actuarially Unfair Annuities $(\lambda_1, \lambda_2 > 0)$

$$k = \frac{p\left[\frac{\pi}{1+\frac{1-\alpha}{\alpha}\zeta p^{1-\lambda_1}} + \frac{(1-\pi)}{1+\frac{1-\alpha}{\alpha}\zeta p^{1-\lambda_2}}\right]}{1+p\left[\frac{\pi}{1+\frac{1-\alpha}{\alpha}\zeta p^{1-\lambda_1}} + \frac{(1-\pi)}{1+\frac{1-\alpha}{\alpha}\zeta p^{1-\lambda_2}}\right]}[A(1-\alpha)k^{\alpha}(1-p\zeta)-\chi]$$

$$c^Y = \frac{1}{1+p\left[\frac{\pi}{1+\frac{1-\alpha}{\alpha}\zeta p^{1-\lambda_1}} + \frac{(1-\pi)}{1+\frac{1-\alpha}{\alpha}\zeta p^{1-\lambda_2}}\right]}[A(1-\alpha)k^{\alpha}(1-p\zeta)-\chi]$$

$$c^H = \left[\frac{\alpha}{p^{1-\lambda_1}} + (1-\alpha)\zeta\right]Ak^{\alpha}$$

$$c^L = \left[\frac{\alpha}{p^{1-\lambda_2}} + (1-\alpha)\zeta\right]Ak^{\alpha}$$

For each of these policies the steady-state equilibrium expected utility of the representative agent can be computed and the expected utility levels compared. Comparison of policies 1 and 4 reveals that the imposition of lump sum taxes or the single fund restriction yields identical equilibrium allocations. Further, policies 1 and 4 are both horizontally equitable as is policy 2. However, since taxes on pension returns are distortionary, policy 2 will lead to lower expected utility than the either policy 1 or 4. Policy 5 results in the same steady state levels for the capital stock and consumption of the young as do policies 1 and 4, but is not horizontally equitable.

While it is possible to solve analytically for expected utility, it is more straightforward to do so numerically. We assume that $p=.252$, the ratio of Social Security beneficiaries to contributors in 2000 (Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, 2001) and that $\zeta=.43$, the replacement rate for those retiring in 2000 who earned the average wage while working (U.S. House of Representatives Committee on Ways and Means, 1998) The values for the other parameters are: $\pi=.75$, $\alpha=.3$, $\lambda_1=.25$, $\lambda_2=.75$, $\chi=.1$, $\xi=.50$, and $A=15$. Under these parameter values an interior steady-state equilibrium exists for all policy regimes. The ranking of regimes by expected utility is found in Table 1.

Table 1
Ranking of Policy Regimes and Horizontal Equity

Policy Regime	Capital Stock	Expected Utility	Horizontal Equity
1 - Lump-Sum Taxes	2.88	3.12	1.00
4 - Single Fund	2.88	3.12	1.00
5 - No Tax - No Transfer	2.88	3.11	1.99
2 - Taxes on Pension Returns	2.53	3.10	1.00
3 - Taxes on Wages	2.54	3.09	1.33
6 - Paygo with Annuities	1.60	2.93	1.58

This ranking suggests that since the risk affects only the old, and thus there are no intergenerational risks to share, policies that redistribute income among the old (policies 1 and 2) dominate those that redistribute income inter-generationally (policies 3 and 6). Moreover, as Table 1 indicates, achieving horizontal equity (the ratio of consumption when old with high returns to consumption when old with low returns) may not be a reasonable policy goal if the only way of funding the redistribution is via distortionary

taxes since to achieve ex post horizontal equity it is necessary to give up ex ante expected utility.

On the face of it, it appears that either policies 1 or 4 will achieve the horizontal equity goal and improve welfare over policy 5. If the lump-sum tax policy is infeasible (since it requires that the government compile a vast amount of information on individual pensioners to determine the person specific lump sum tax, and so could be very costly to execute rather than costless as assumed in the analysis), a single fund may effect an improvement on the no tax - no transfer regime even if there are costs to the government of administering the pensions accounts (though not the pension funds). This is because, to the extent that pension fund costs are driven by advertising and by administering small accounts, their costs would fall since there would be no reason to advertise and since the government would be administering the accounts. Thus, even if the government is less efficient in administering the small pension accounts, there is still the potential for cost reduction and consequently improvements in individual welfare.

The results are robust to changes in the parameters. For example, decreasing the probability of investing in a low charge fund, π, reduces the steady state expected utility under all policy regimes without changing the ranking given in Table 1. The ranking also is not dependent on the specific values of the cost parameters, λ_1 and λ_2, nor is it necessary that $\lambda_1 + \lambda_2 = 1$.[9] Increasing both λs while holding the ratio λ_1/λ_2 constant results in greater horizontal inequity in policies 3, 5 and 6. In contrast, raising the ratio λ_1/λ_2 reduces horizontal inequity in these three policies.

[9] The inequality $\lambda_1 < \lambda_2$ is required to preserve the ranking.

Decreasing the tax rate on wages, $\tau_{w,}$ in policies 3 and 6 increases expected utility. If the replacement rate, ζ, is very small it is possible that (holding ξ fixed) policy 6 dominates policy 3 in expected utility.[10] If ξ is reduced then policy 3 dominates policy 2 in expected utility.[11] The increase in expected utility that results from a decrease in τ_w in policy 3 or policy 6, however, comes at the cost of greater horizontal inequity. Setting ξ and ζ=0 reduces policies 3 and 6 to policy 5 (no taxes or transfers).

V. Conclusions

In this paper we have developed a model of privatized, government mandated pensions. We have shown that if the dominant form of individually undiversifiable risk faced by pensioners is administrative cost risk (as a result of advertising, etc.) that leads to ex ante identical pensioners earning different returns on their ex ante identical pensions, then the government can improve upon the market outcome, in both expected utility and horizontal equity terms, by restricting the choice of pensions to a single fund (which could/would be a composite of many private sector funds).[12] Further, should the government be more efficient than the private sector at managing small accounts, as Diamond (1999) suggests, and should government account management reduce pension firms' costs by removing the need to advertise to attract accounts, then average portfolio returns would increase as well. Thus, our results, in practice, would look much like

[10] The critical value for ζ is .06609 using the parameters listed in the text.

[11] The critical value for ξ is .3472. Likewise for ζ less than .04686, policy 6 dominates policy 2 in expected utility.

[12] If the undiversifiable risk is portfolio risk, and if an individual pension fund fails, some pensioners would see their pension eliminated because of an unlucky investment choice. Such an outcome would be likely to call forth a public policy response such as the use of general funds to subsidize the unlucky pensioners. However, if the government offers all agents a single fund comprised of many privately managed portfolios (which together constitute the market), the failure of any one portfolio would have a

Gramlich's Individual Accounts plan, as presented in the *Report of the 1994-1996 Advisory Council on Social Security*. This result generalizes to all other undiversifiable portfolio risks that fall on the elderly alone. If, contrary to the assumptions of this model, most risks are intergenerational in nature, then government mandated private pensions do not and cannot overcome these risks.[13]

Thus, whether government mandated private pensions can provide a dependable and equitable foundation for retirement security depends in large part on the types of risks faced by the average pensioner. If most risks are intergenerational in nature, then the answer is a clear no. If most risks are intragenerational in nature, then the prospects are, in principle, good.

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negligible effect on the system.

[13] Rangel and Zeckhauser (1999) establish that neither market mechanisms nor the current pay-as-you-go social security system overcome intergenerational risks. Funded pensions fail on this count as well since they can, at best, effect intragenerational redistributions.

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